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Assessing Consumer Preferences for Country-of-Origin Labeling

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In this paper, we assess consumer willingness to pay for a mandatory country-of-origin labeling (COOL) program applied to beef ribeye steaks, chicken breasts, and pork chops, all labeled as "Certified U.S." products. A consumer survey was mailed in spring and early summer 2003 to households in the continental United States. Results indicate that consumers are in general very concerned about food safety issues, viewing U.S. meat as the safest among the selection of countries considered. Nevertheless, consumer willingness to pay for Certified U.S. products is relatively small, although above the expected implementation costs associated with a mandatory labeling program. This finding coincides with the fact that only 36% of the sample favored consumers paying directly for the costs related to a mandatory COOL program.

Key Words: beef, consumer preferences, country-of-origin labeling, dichotomous choice, willingness to pay

JEL Classifications: D12, Q13

The 2002 Farm Security and Rural Investment Act (2002 Farm Bill) contains a provision mandating retailers to provide consumers with country-of-origin labeling (COOL) information at the point of purchase for ground and whole-muscle cuts of beef, pork, and lamb. Seafood, peanuts, and fruits and vegetables are also included in the mandatory COOL law. The COOL program guidelines created by the USDA Agricultural Marketing Service (AMS), the government agency responsible for implementing COOL, state that only meat products from animals born, raised, and processed in the United States can be labeled as a "Product of the U.S.A." Imported products produced entirely in any country other than the United States would be labeled as a "Product of Country X" (USDA/AMS 2003).

The 2002 COOL provision has become one of the most polemic labeling programs. The 2002 Farm Bill's country-of-origin provision states that mandatory COOL at the retail level shall begin by September 30, 2004. However, because of industry concerns, in January 2004, legislation was signed into law postponing implementation of mandatory COOL for all commodities except wild and farm-raised fish and shellfish until September 30, 2006 (USDA/AMS 2004). Thus, the COOL program is currently voluntary, but proponents of COOL are continually lobbying for reinstatement of mandatory COOL.

Initially, the COOL law was proposed on the premise that consumers have a right to know where their food comes from and that COOL would increase demand for U.S. meat products (Becker). Thus, proponents believed

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COOL would not only enhance the welfare of consumers, but also producers' welfare. For producers to benefit from an increase in demand, the same quantity of U.S. meat products would have to sell at a higher price in the market, a larger quantity of U.S. meat would have to sell at the same price, or a combination of both increased market price and increased quantity would have to occur.

Much of the current debate originates from interested parties' concerns over meat products excluded from the provision, as well as the extent of the costs associated with labeling requirements and origin verification methods. Under the current COOL law, poultry products, dairy products, meat sold through the restaurant and food service sector, and small retailers with less than $230,000 of annual sales are all exempt from mandatory COOL. Producers and consumer advocate groups have proposed that if consumers have the right to know of the origination of their food, then all meat products (including poultry) should be required to carry labels denoting country of origin.

Additionally, there is concern that the costs of complying with COOL would ultimately be passed on to the consumer and could potentially have a negative effect on producers of covered meat products. This might occur if consumers shift their consumption away from a covered meat product such as beef or pork and to a competing meat product such as poultry. For example, a comprehensive cost study by Andersen and Kay found mandatory COOL would cost the beef industry an additional $0.10/pound and the pork and seafood industries an additional $0.075/pound. Two separate studies by Lusk and Anderson and Brester and Marsh found asymmetric welfare effects at different levels of the food chain from COOL and suggested that increases in consumer demand would be necessary for COOL to be beneficial to producers. Several other studies have attempted to estimate the costs of COOL to the livestock industry (Davis; Hayes and Meyer; Krissoff et al.; USDA/AMS 2002, 2003; VanSickle et al.). These cost estimates vary extensively, ranging from millions to billions of dollars annually for the meat industry.

In spite of the continuing COOL debate and the fact that the 2002 Farm Bill mandates COOL of most perishable agricultural products, little research has been conducted to assess the effect of COOL on demand for products from the affected sectors of the livestock industry. It is not apparent whether U.S. consumers would prefer to have their meat labeled with the country of origin and whether they value labeling of all meat or just specific meat products. Given the currently unanswered questions surrounding COOL for meat products, the objectives of this paper are twofold: (1) to estimate consumers' willingness to pay (WTP) for three types of meat products (beef, chicken, and pork) and (2) to examine the role played by sociodemographic characteristics in determining willingness to pay for the different meat products. Additional quantitative information is presented regarding the payment method respondents believe to be fairest for covering costs associated with a mandatory COOL program, respondent food safety perceptions surrounding domestic and imported meat products, and trust levels in surveillance authorities.

Although poultry products are not included in the current COOL provision, it is interesting to examine the relative value of labeling poultry products versus other meat products that are included in the law, such as beef and pork, to provide information relevant to the debate over amending the law to include poultry products. The WTP values assessed for individual meat products will allow us to compare the relative WTP values for each meat product to the associated relative costs of COOL of meat products. These relative WTP estimates are not currently available, yet they are important for comparing alternative COOL policies.

Literature Review

In many countries, local products carry a certain reputation for quality. Quagrainie, Unterschultz, and Veeman compared a popular beef product from Alberta with a similar product

produced elsewhere in Canada. They found the price of the non-Alberta meat product had to be reduced by 15% so that consumers would be indifferent between the two sources. Loureiro and McCluskey found that Spanish consumers were willing to pay a premium for fresh meat products labeled with a Protected Geographical Identification (PGI) label, "Galician Veal," which is regulated by the European Union. Although consumers were willing to pay a premium for the beef with a Galician Veal label, the premium varied depending on the cut and quality of beef.

Consumers in France, Germany, and the United Kingdom were surveyed to determine European consumers' preferences for beef labeling strategies associated with origin labeling, private brands, and mandatory labeling of beef from cattle fed genetically modified corn (Roosen, Lusk, and Fox). Consumers in France and Germany indicated that the origin of their beef was more important than any other product attributes such as brand, price, marbling, or fat content. In the United Kingdom, however, consumers ranked origin labeling as more important than brand labeling, but steak color, price, and fat content were most important (Roosen, Lusk, and Fox). Although these studies indicate consumers are willing to pay a premium for geographically labeled products, they are likely not representative of U.S. consumers' preferences.

In a study of U.S. consumers, Umberger et al. (2002) found in blind taste tests that consumers could taste and were willing to pay a significant premium of $0.70 per pound (on average) for corn-fed beef raised in the United States versus grass-fed beef raised in and imported from Argentina. The segment of consumers who preferred the U.S. corn-fed beef (62%) were willing to pay an average premium of $1.61 per pound. However, a portion (23%) of the consumers preferred and were willing to pay a $1.36 per pound premium for the Argentine, grass-fed beef.

Few studies have examined consumers' perceptions associated with country-of-origin labels on beef products in the United States. Schupp and Gillespie (2001a) sampled beef processors, retailers, and restaurants in Louisiana to identify why beef-handling firms would either support or reject a mandatory COOL policy. They found supporters of the law believed their consumers would find the label valuable, whereas opponents of the law thought that mandatory labeling simply meant more government intervention. In another study, Schupp and Gillespie (2001b) surveyed Louisiana households to analyze consumers' degree of support for mandatory COOL of beef in grocery stores and restaurants. Over 80% of their respondents supported a compulsory labeling program. Although these studies show beef handlers' and consumers' support of mandatory labeling, they do not shed light on whether or not consumers would be willing to pay the additional costs associated with the mandatory labeling policy.

In a sample of Colorado consumers, Loureiro and Umberger estimated the mean willingness to pay for a U.S. mandatory labeling program, as well as for "Certified U.S." steak and hamburger, concluding consumers are willing to pay premiums ranging from 38% to 58% to obtain Certified U.S. beef. In another study, experimental methods were used to determine Chicago and Denver consumers' preferences for steak after visually evaluating and bidding on two steaks, which differed only in package labels. One steak was labeled "Guaranteed U.S.A.: Born and Raised in the U.S.," and the other steak was unlabeled. Seventy-five percent of the 273 consumers indicated they would prefer to have their meat labeled with the country of origin, however only 69% of the consumers were willing to pay an average premium of 19% for the U.S.-labeled steak (Umberger et al. 2003).

The current research will resolve pending questions regarding U.S. consumers' preferences and willingness to pay for COOL of meat products, extending both the context and geographical dimensions of previous studies.

Methods

To elicit consumers' willingness to pay for the three labeled meat products, Certified U.S. ribeye steaks, chicken breasts, and pork chops, we implemented a set of dichotomous choice

questions. Specifically, each consumer was asked three valuation questions of the following form.

> Assume that the cost of traceability required to label a ribeye beef steak as "Certified U.S. Beef" is $[price]/pound in addition to the traditional $6.75/pound price; would you be willing to pay this premium in order to guarantee that your beef is "Certified U.S. Beef"?
>
> a. Yes
>
> b. No

Other consecutive and similar questions were asked for the valuation of chicken breasts and pork chops. In the questionnaire design, the national average prices published by the USDA (USDA/ERS) were used as reference or baseline prices. The baseline prices for chicken breasts and pork chops were $2.07/pound and $3.46/pound, respectively. These initial prices corresponded to the average prices for the nonlabeled meat products at the time the survey was conducted. In all three cases, the bid amounts were percentage values in increments of 5% over the initial value of the product, adding up to a maximum premium of 75%. This bid design was pretested with open-ended WTP questions.

The individual responses to dichotomous choice WTP questions for these three country-of-origin–labeled products might not be independent; therefore, we modeled the three responses in a panel format with a binary logit model, such that

$$(1) \qquad \mathrm{WTP}_{ij} = \alpha + \beta_j \mathrm{Bid}_{ij} + \gamma \mathbf{Z}_i + \varepsilon_{ij},$$

where WTP_{ij} indicates the dichotomous response (No = 0, Yes = 1) to the WTP question (which is a proxy for the latent WTP*) of participant i for product j, and α, β, and γ are the coefficients to be estimated. The Bid_{ij} variable represents the premium for each of the j products that consumer i faced. In this way, we can compare the WTP values elicited for the three different products. The vector $\mathbf{Z}$ includes the sociodemographic characteristics and consumer food safety perceptions of each individual respondent. The error term $\varepsilon_{ij} \sim G(0, \sigma^2)$ follows a standard logistic distribution denoted by $G(\cdot)$, having mean zero and standard deviation $\sigma = \pi/\sqrt{3}$.

Equation (1) was estimated via maximum likelihood. The respective WTP estimates were calculated as Hanemann proposed, such that

$$(2) \qquad E(\mathrm{WTP}_j) = -\frac{1}{\hat{\beta}_j}\ln(1 + \exp^{\hat{\alpha}}).$$

Notice that this formula employs the $\hat{\beta}_j$ coefficient associated with each of the respective bid amounts, and the $\hat{\alpha}$ coefficient represents the so-called grand constant. The grand constant is the sum of the products of the estimated coefficients times their respective explanatory variables (excluding the Bid coefficients). This formula restricts the WTP to positive values, which is a reasonable assumption for a private good.[1]

Data

During Spring 2003, data were gathered by a mail survey sent to households in the continental United States. A representative sample of 5,000 participant households was drawn from a mail listing purchased from Survey Sampling Inc., a leader in the science of sampling methodology and research quality. This listing is compiled from white pages directories and supplemented with a variety of other sources such as Department of Motor Vehicles information, voter information, and census data. Thus, the listing is expected to be representative of the current U.S. Census. Survey design and data collection procedures followed the survey design methods proposed by Dillman.[2] Before the survey was mailed, a

[1] Note that the formula $E(\mathrm{WTP}) = -(\hat{\alpha}/\hat{\beta})$ potentially could be applied, and it provides lower point estimates. This is because it does not restrict the mean WTP estimates to the positive range. In our case, this is not a very realistic assumption because it is most likely that consumers have a positive or zero willingness to pay for products labeled with country of origin.

[2] Because of budgetary constraints, no economic compensation was used to increase the participation rate by inducing response.

pretest was conducted with consumers in two U.S. cities. With the use of the information gathered in the pretest to make slight modifications, the final survey was sent out in a seven-page booklet format, with a hand-signed cover letter explaining the project and a postage-paid return envelope. A second survey and postage-paid return envelope were mailed out during the early summer months to the households who did not respond in the first attempt.

The survey solicited information regarding respondents' purchasing behavior and attitudes about beef products; beef qualities that consumers find most desirable; food safety attitudes; and willingness to pay a given premium for beef steak, chicken breast, and pork chops labeled Certified U.S. Additionally, consumers were asked to indicate the agency they believed would be most suitable for certifying the origin of meat products and the fairest mechanism to pay for costs that might arise from a mandatory COOL program. Finally, sociodemographic characteristics were elicited in the last section of the survey.

Empirical Specification

To test the role of the different sociodemographic characteristics on consumer response for the three labeled products, the logit model in Equation (3) was estimated. This model includes the cross products of the sociodemographic characteristics with the indicator variables that denote each of the three meat types (chicken, pork, and beef, respectively). The estimated model has the following functional representation.

$$
\begin{aligned}
(3)\quad WTP_{ij}^{*} &= \alpha_0 + \beta_1 BidChicken_i + \beta_2 BidPork_i \\
&\quad + \beta_3 BidBeef_i + \beta_4 Age_i * Chicken \\
&\quad + \beta_5 Age_i * Pork + \beta_6 Age_i * Beef \\
&\quad + \beta_7 LowEdu_i * Chicken \\
&\quad + \beta_8 LowEdu_i * Pork + \beta_9 LowEdu_i * Beef \\
&\quad + \beta_{10} HighEdu_i * Chicken \\
&\quad + \beta_{11} HighEdu_i * Pork + \beta_{12} HighEdu_i * Beef \\
&\quad + \beta_{13} Children_i * Chicken \\
&\quad + \beta_{14} Children_i * Pork + \beta_{15} Children_i * Beef \\
&\quad + \beta_{16} LowInc_i * Chicken \\
&\quad + \beta_{17} LowInc_i * Pork + \beta_{18} LowInc_i * Beef \\
&\quad + \beta_{19} HighInc_i * Chicken \\
&\quad + \beta_{20} HighInc_i * Pork + \beta_{21} HighInc_i * Beef \\
&\quad + \beta_{22} Gender_i * Chicken \\
&\quad + \beta_{23} Gender_i * Pork + \beta_{24} Gender_i * Beef \\
&\quad + \beta_{25} FoodSafety_i * Chicken \\
&\quad + \beta_{26} FoodSafety_i * Pork \\
&\quad + \beta_{27} FoodSafety_i * Beef + \varepsilon_{ij}.
\end{aligned}
$$

The indicator variables *Chicken, Pork,* and *Beef* represent each of the meat types. $BidChicken_i$, $BidPork_i$, and $BidBeef_i$ represent the cross products of the indicator variable that signals each of the corresponding meat types times the random amount each respondent i was asked to pay for a pound of chicken breast, pork chops, and beefsteak labeled with the country of origin. The variables Age_i, $Gender_i$, and $Children_i$ represent the age of the respondent measured in years; the gender represented by an indicator variable that takes the value of 1 if the respondent is a female and 0 otherwise; and an indicator variable that takes the value of 1 if children younger than 18 years of age are living in the household and 0 otherwise, respectively (Table 1).

To allow for nonlinear relationships between the dependent and independent variables, *Education* and *Income* are introduced as a series of indicator variables that represent the lowest and highest values of the categorical variables. In particular, the variable $LowEdu_i$ represents respondents whose education level is less than or equal to high school, whereas $HighEdu_i$ represents respondents whose education level is equal to or more than a 4-year university degree. Additionally, $LowInc_i$ represents individuals with an annual household income after taxes in 2002 of less than $30,000, whereas $HighInc_i$ indicates individuals with an annual household income equal to or more than $50,000 for the same period (Table 1). Finally, $FoodSafety_i$ measures participants' stated importance rated

Table 1. Summary Statistics for the Demographic Variables

Variable Name	Description (Coding)	Mean	SD
Age	Years	55.118	21.182
Gender	1 if female 0 if male	0.532	0.511
Shopper	1 if primary household shopper 0 if otherwise	0.857	0.349
Education	1 = Elementary 2 = Some high school (HS) 3 = HS diploma 4 = Some college 5 = Junior college 6 = B.A. or B.S. 7 = Graduate school	5.107	1.674
Children	1 if children <18 living in the household 0 if otherwise	0.346	0.501
Family Size	Number of family members living in the household	1.904	0.745
Income	2001 annual household income: 1 = <$20,000 2 = $20,000–$29,999 4 = $30,000–$39,999 5 = $40,000–$49,999 6 = $50,000–$59,999 7 = $60,000–$69,999 8 = ≥$70,000	6.134	2.789
Race	1 if White 0 if otherwise	0.912	0.283

on a five-point Likert scale (see Table 2) of food safety inspection when shopping for meat. All of these sociodemographic characteristics were interacted with the three indicator variables: *Chicken, Pork,* and *Beef.* Thus, the cross-product variables represent the product of the included sociodemographic and food safety variables with the corresponding indicator variables of the respective meat types. ε_{ij} is the error term that follows a logistic distribution.

Additionally, and to explore the presence of nonobserved heterogeneity, a random effects logit model was estimated. In this model, the error term ε_{ij} represents a combination of two processes, such that $\varepsilon_{ij} = v_i + u_{ij}$, where v_i represents an individual nonobserved heterogeneity component uncorrelated with the explanatory variables and u_{ij} a stochastic error term. The v_i in this particular application is assumed to follow a Gaussian distribution with mean 0 and variance s_v^2, whereas u_{ij} is assumed to follow a logistic distribution with mean 0 and s_u^2, respectively. We can account for the correlation in the responses of the WTP questions coming from the same individual i at different time periods (or responses, r) t and s, such that $r(\text{WTP}_{it}, \text{WTP}_{is}) = s_v^2/(s_v^2 + s_u^2)$, for which this correlation can be substantial.

Results

From the 5,000 surveys mailed, 216 were returned because of insufficient information in the address, and 632 were returned completed, which contributes to a response rate of about 13%.[3] The majority of respondents were the

[3] This response rate is similar to rates obtained in other published, contingent valuation, unsolicited, bulk

Table 2. Mean Ratings of Desirable Meat Attributes (1 = Not at All Desirable; 5 = Extremely Desirable)

Attribute	Mean	SD
Food Safety Inspected (*Escherichia coli* and *Salmonella* free)	4.802 A	0.503
Freshness	4.771 A	0.472
High-Quality Grade	4.406	0.674
Reasonably Priced	4.357 B	0.769
Meat Produced in the United States	4.306 B	0.878
Good Visual Presentation	4.236	0.815
Lean	4.165 C	0.803
Tenderness Assurance	4.164 C	0.816
Nutritional Value	4.117 C	0.863
No Added Growth Hormones or Antibiotics	4.022	1.140
Source Assurance (Knowing Who Produced Your Meat)	3.857	1.100
Humane Production Methods	3.750 D	1.192
Premium Brand	3.714 D	0.987
Meat Produced or Raised Locally	3.451	1.135
Organic Production Methods	2.969	1.174

Note: Mean ratings of meat attributes with the same letters are not statistically different from one another at the $\alpha = .05$ level of significance. For example, the mean ranking of the attribute Food Safety Inspected is not statistically different from the mean rating of Freshness.

primary food shoppers of the household (85%), White (91%), and female (53%). The respondents' average age was about 55 years, and 35% of all respondents had children under the age of 18 years old living in their household. The mean household income of the sample was calculated to be about $50,000 after taxes for the 2002 calendar year, and their average education was a junior college degree. Demographic summary statistics are presented in Table 1. The sample is comparable to the U.S. Census (U.S. Census Bureau) in terms of gender, education, income, number of children per household, and household size. However, this sample includes fewer minorities, and participants are slightly older than the mean age reported by the U.S. Census. As with all surveys, there could be some degree of sample selection bias in which the respondents who were more interested in the COOL program elected to participate in the survey. The effect of sample selection on our results concerning country-of-origin labels is impossible to determine.[4]

Respondents were asked to indicate the importance of 15 attributes that consumers might look for when purchasing meat. Pairwise *t*-tests were used to statistically compare differences in mean ratings between attributes. Table 2 shows that the attributes Food Safety Inspection and Freshness were rated statistically higher on a five-point Likert scale than any other meat attributes. High-Quality Grade and Reasonably Priced were also rated as extremely desirable to very desirable. Other attributes, such as U.S. origin, Good Visual Presentation, Leanness, Tenderness Assurance, and Nutritional Value were also ranked as very desirable on average. These relative ratings are similar to other studies conducted with smaller samples (see Loureiro and Um-

mailing studies in which no economic compensation was used (e.g., Lusk; Roosen, Lusk, and Fox; Sherrick et al.). It is possible that a monetary incentive would have increased our response rate. However, the length and complexity of the survey might also have affected the response rate.

[4] Weighting of observations might be a solution to overcome the problems posed by a sample that is not entirely representative of the U.S. population. However, the practice of weighting estimates is not exempt from criticism. A large amount of auxiliary information has to be available to the researchers, from both respondents and nonrespondents. Unfortunately, as in most surveys, we do not have any information regarding the nonresponses for some of the explanatory variables, such as the importance of food safety.

Table 3. Perceived Safety of Meat Products from Various Countries of Origin (1 = Not at All Safe; 5 = Extremely Safe)

Country	Mean	SD
United States	4.216	0.678
Canada	3.657	0.842
México	2.135	0.836
Australia	3.130	0.921
New Zealand	3.082	0.951
Denmark	2.989	0.929
Argentina	2.623	0.901
Hypothesis Test[a]	***t*-test value**	***p* value**
H_0: $\mu_{U.S.} - \mu_{Canada} = 0$	34.718	.000
H_0: $\mu_{U.S.} - \mu_{México} = 0$	49.570	.000
H_0: $\mu_{U.S.} - \mu_{Australia} = 0$	49.570	.000
H_0: $\mu_{U.S.} - \mu_{New\ Zealand} = 0$	26.595	.000
H_0: $\mu_{U.S.} - \mu_{Denmark} = 0$	46.930	.000
H_0: $\mu_{U.S.} - \mu_{Argentina} = 0$	50.083	.000

[a] Tests of differences in mean ratings of perceived safety of meat originating from the United States versus mean of six other countries (H_0: $m_{U.S.} - m_{country\ j} = 0$ versus H_a: $\mu_{U.S.} - \mu_{country\ j} \neq 0$).

berger; Umberger et al. 2003). It is interesting to note that brands, Meat Produced or Raised Locally, and Organic Production Methods were the attributes with the three lowest rankings.

Proponents of mandatory COOL have argued that domestic meat is perceived by U.S. consumers to be safer than imported meat. To examine U.S. consumers' safety perceptions of domestic versus imported meat products, respondents used a scale from 1 (not at all safe) to 5 (extremely safe) to rate the safety of meat originating from the United States and six major meat or livestock importers: Argentina, Australia, Canada, Denmark, Mexico, and New Zealand. In terms of food safety perceptions associated with the country of origin of meat products, respondents indicated (as shown in Table 3) that meat produced domestically is perceived to be the safest, followed by meat produced in Canada. However, consumers rated meat from Mexico and Argentina as the least safe meats, below meat from Australia, New Zealand, and Denmark, a country that has suffered outbreaks of bovine spongiform encephalopathy (BSE or mad cow disease). Pairwise *t*-tests indicate the statistical difference between respondents' perceptions of the safety of U.S. meat versus their safety perceptions of all other origins of meat included in the survey (see Table 3). Thus, U.S. meat is perceived to be safer than meat originating from any of the six other nations.[5] It is important to note that, although U.S. meat is perceived to be of better quality than major importers' meat from a food safety standpoint, domestic meat might be deemed lower quality on other attributes. For example, grass-fed beef from Argentina and Australia is perceived by some U.S. consumers to have a better flavor than U.S. beef (Sitz et al.; Umberger et al. 2002), and some U.S. consumers prefer the quality of New Zealand and Australian lamb to domestic (Krissoff et al.).

Respondents were also asked to indicate the agency they believed would be most suitable to certify the origin of meat, as well as the fairest way to pay for the costs incurred from a mandatory COOL program. Approximately 60% of the consumers indicated that they prefer the government (USDA/AMS inspection services) to certify the origin of their meat products. This high percentage reflects strong confidence of U.S. consumers in the inspection services of the U.S. government. Other entities preferred as the best certification agencies third-party independent certifiers, with 20.8% of the support, and local producers, with 12.7% of support. Only 7.9% of the participants indicated other agencies would provide the most desirable way of certification. These results would tend to support the current USDA/AMS COOL guidelines, which state that self-certification (by suppliers) of country-of-origin is not sufficient.

[5] This research was conducted before the December 23, 2003, case of BSE (mad cow disease) in Washington State. A survey conducted in January 2004 found that 85% of the 1,001 continental U.S. consumers surveyed were knowledgeable about the December U.S. BSE case. However, of the knowledgeable consumers, the majority indicated their confidence in the U.S. beef supply remained unchanged, and 8% indicated their confidence had increased (Hallman, Schilling, and Turvey).

With respect to the fairest mechanism for paying for the COOL-related certification costs, respondents showed a clear division of opinions. Nearly 39% suggested the associated costs should be paid with the use of the existing government budget through reducing expenditures on other programs or infrastructures. However, 36.2% believed that the costs should be paid via higher meat prices that could compensate industry expenditures. The other 10.9% of respondents believed the associated costs should be paid for by fees applied to producers, and 2% preferred a higher income tax. The rest of the sample (about 12%) preferred to use another payment mechanism; with most of them indicating that import levies and tariffs on imports would be the fairest mechanisms. Consequently, only about a third of the sample favored consumers paying directly for the mandatory COOL program.

Econometric Results

To analyze the different roles played by sociodemographic characteristics and food safety perceptions on the WTP decisions of respondents for each of the three meat products, Equation (3) was estimated. The specification in Equation (3) is rather useful to determine whether the WTP decisions for the three types of meat products are equally affected by consumer characteristics and food safety perceptions. In addition to using a binary logit model specification, Equation (3) was also estimated with a random effects logit model to account for the nonobserved heterogeneity (preference differences that are not related to sociodemographic variables).

The coefficients from both estimations are presented in Table 4. In terms of general fit of the model and statistical significance, the results were improved when estimating a logit model with random effects. Likelihood ratio tests, as well as a higher number of statistically significant variables, indicate the superiority of the random effects model relative to the binary logit model. Furthermore, the magnitude of the estimated correlation coefficient r is also very close to 1 and is statistically significant. Thus, indicating that the proportion of the variance from random effects is important and statistically significant reassures that the random effects model is more appropriate. Therefore, although both sets of results are included (with the first set used as a baseline type of scenario), we focus our discussion of results on the estimated coefficients of the random effects logit model (last three columns of Table 4).

As expected, the coefficients associated with the three assigned bids are all negative and statistically significant. As demand theory predicts, the higher the premium or amount a consumer is requested to pay, the less likely a consumer will be willing to pay the premium. Of the three bid coefficients, the magnitude of the *BidChicken* coefficient is the largest, indicating that the effect of increasing the premium for Certified U.S. labeling on a participant's probability of being willing to pay for COOL is largest for *Chicken* and smallest for *Beef*.

Several sociodemographic variables are also significant in explaining the likelihood of a consumer being willing to pay a premium for Certified U.S. meat products. The sign and significance of the *Age*Beef* coefficient indicates that older individuals are less likely to be willing to pay a premium for the Certified U.S. label. Although the *Age*Chicken* and *Age*Pork* coefficients are also negative, they are not statistically significant. Higher educated consumers are also less likely to be willing to pay premium for U.S.-labeled meat products; however, only the coefficients on *HighEdu*Pork* and *HighEdu*Beef* are significant. On the basis of the sign and significance of all coefficients related to gender (*Gender*Chicken, Gender*Pork, Gender*Beef*), females are more likely to be willing to pay a premium for all meat products labeled Certified U.S. Loureiro and Umberger found a similar significant relationship between gender and willingness to pay for COOL of steaks in their regional study of Colorado consumers. Income also appears to have a significant effect on willingness to pay for Certified U.S. beef and pork products. Low-income consumers are less likely to be willing to pay for Cer-

Table 4. Estimates from a Binary Logit and a Logit Model with Random Effects (N = 1,833)

	Logit Model				Logit Model with Random Effects		
Variable	Coefficient	SE	Marginal Effects	SE	Coefficient	SE	p value
Constant	−0.382	0.511			−4.147	2.724	0.128
BidChicken	−1.225	0.188***	−0.2481	0.0383	−5.364	0.771	0.000
BidPork	−0.590	0.116***	−0.1196	0.0233	−2.385	0.423	0.000
BidBeef	−0.256	0.061***	−0.0519	0.0380	−1.065	0.224	0.000
Age*Chicken	−0.001	0.005	−0.0003	0.0525	−0.012	0.019	0.507
Age*Pork	0.001	0.005	0.0002	0.0009	−0.009	0.018	0.610
Age*Beef	−0.002	0.005	−0.0003	0.0010	−0.043	0.022	0.047
LowEdu*Chicken	−0.029	0.262	−0.0059	0.0525	−0.250	0.977	0.798
LowEdu*Pork	0.169	0.267	−0.0353	0.0575	0.390	0.874	0.656
LowEdu*Beef	−0.121	0.278	−0.0239	0.0535	−1.018	0.963	0.290
HighEdu*Chicken	−0.492	0.215**	−0.0059	0.0373	−0.737	0.687	0.283
HighEdu*Pork	−0.520	0.228**	−0.0968	0.0385	−1.101	0.657	0.094
HighEdu*Beef	−0.577	0.235**	−0.1063	0.0389	−1.527	0.734	0.038
Gender*Chicken	0.473	0.187**	0.1016	0.0423	1.673	0.702	0.017
Gender*Pork	0.493	0.199**	0.1063	0.0451	1.494	0.640	0.019
Gender*Beef	0.471	0.207*	0.1012	0.0466	1.544	0.724	0.033
LowInc*Chicken	−0.312	0.283	−0.0593	0.0502	−1.759	1.088	0.110
LowInc*Pork	−0.177	0.294	−0.0346	0.0554	−2.285	1.073	0.033
LowInc*Beef	−0.043	0.303	0.0086	0.0623	−3.820	1.123	0.001
HighInc*Chicken	0.071	0.228	0.0146	0.0469	1.292	0.918	0.159
HighInc*Pork	0.128	0.242	0.0264	0.0507	1.218	0.726	0.094
HighInc*Beef	0.249	0.253	0.0520	0.0543	1.915	0.849	0.024
Children*Chicken	−0.157	0.204	−0.0309	0.0391	−1.522	1.046	0.146
Children*Pork	−0.326	0.218	−0.0623	0.0392	−0.702	1.048	0.503
Children*Beef	−0.736	0.238**	−0.1296	0.0353	−2.002	1.325	0.031
FoodSafety*Chicken	0.262	0.145*	0.0530	0.0294	1.036	0.566	0.067
FoodSafety*Pork	0.066	0.146	0.0134	0.0295	0.237	0.583	0.684
FoodSafety*Beef	0.047	0.150	0.0095	0.0303	0.470	0.612	0.443
$\ln(\sigma^2)v$					4.193	0.192	
$\sigma\ v$					8.136	0.780	
r					0.953	0.009	
Likelihood ratio test of $r = 0$					755.65		0.000
Likelihood value	−966.726				−588.899		

Note: A coefficient is statistically significant at *** α = .000, ** α = .01, and * α = .1. Although 632 surveys were returned, 21 surveys contained missing observations; therefore, 611 respondents were used in this econometric analysis (N = 661 × 3 = 1,833).

tified U.S. pork chops and beef steaks, and high-income consumers are more likely to be willing to pay for U.S.-labeled pork and beef.

The interaction terms between the indicator denoting that children under 18 are living in the household and the indicator variables that represent chicken breasts (*Children*Chicken*) and pork chops (*Children*Pork*) are both negative, although not statistically significant, whereas the cross product of beef and children (*Children*Beef*) is also negative, but it is statistically significant. The coefficients on the variables representing the cross products of food safety attitudes and meat types (*FoodSafety*Chicken*), (*FoodSafety*Pork*), (*FoodSafety* Beef*) are all positive; however, only the coefficient on the variable *FoodSafety*Chicken* is statistically significant. This indicates that consumers who ranked food safety inspection as very desirable were more likely to be willing to pay a premium

Table 5. Willingness-to-Pay Estimates and Standard Errors for Certified U.S. Meat

Meat Product	Mean WTP Estimate	90% Confidence Limits
Certified U.S. Chicken Breasts	$0.051/pound	(0, 0.175)
Certified U.S. Pork Chops	$0.088/pound	(0, 0.304)
Certified U.S. Beef Steaks	$0.198/pound	(0, 0.682)

[a] $CL_j = -1/\hat{\beta} \ln(1 + \exp^{\hat{\alpha}}) \pm T_{critical} SE_{bootstrap}$, $T_{critical} = 1.65$ for 90% confidence limits.

for Certified U.S. meat. Consequently, it is quite plausible that consumers are willing to pay for COOL of chicken breasts not only because its baseline price is cheaper but also because consumers might perceive Certified U.S. chicken as a product assuring high quality standards.

In general, on the basis of the signs of the coefficients, demographics have similar directional effect on willingness to pay for COOL across meat products. However, of the significant coefficients, not all are significant for all three meat products. Consequently, we conclude that the relative importance of demographic variables differs among meat products. For example, only two of the demographic interaction terms with the chicken breast indicator variable are statistically significant (*Gender*Chicken* and *Food-Safety*Chicken*), whereas nearly all of the demographic interaction terms with the beef steak indicator variable are significant. Additionally, of the significant demographic variables, the magnitudes of the coefficients interacting with the indicator variable *Beef* (relative to the indicator variables *Chicken* or *Pork*) are the largest. The use of demographic variables to target market consumers who potentially would be willing to pay a premium to obtain Certified U.S. meat products appears to be relatively easier for beef steaks than for chicken breasts or pork chops.

Willingness-to-Pay Estimates

By employing the estimated coefficients from the random effects logit model [Equation (3)] and first calculating the grand constant for each individual observation, which will replace $\hat{\alpha}$ in Equation (2), we are able to obtain mean WTP point estimates for the COOL of each of the individually labeled meat products. These mean WTP estimates are calculated by summing up each of the individual WTP estimates for each specific meat cut and then dividing by the total sample size. The mean WTP estimates and their respective confidence intervals are presented in Table 5. The premium for Certified U.S.–labeled chicken breasts was calculated as $0.05/pound over the base price, or 2.5% more than the initial price. The WTP estimates for Certified U.S. pork and beef are slightly higher than for chicken breasts. Mean WTP values for COOL of pork and beef were calculated to be about $0.09/pound and $0.20/pound, respectively. These are premiums of 2.5% for pork and about 2.9% for beef. Therefore, the WTP values for U.S.-labeled poultry, pork, and beef products are the same in relative terms (percentages).[6]

Even though the estimated premiums for beef and pork are slightly higher than Andersen and Kay's cost estimates of $0.10/pound of beef and approximately $0.08/pound of pork, they do not indicate that benefits will exist at the producer level. These estimated premiums are average values for the entire sample. Although respondents might have an interest in a COOL program, only about 30% of the respondents indicated they would be willing to pay (by answering Yes to the dichotomous choice question) a premium greater than 5% for Certified U.S. meat products.[7]

[6] If we work under the assumption that average consumers might dislike U.S. beef so much that they might buy it only if offered at a discounted price and apply the formula $E(\text{WTP}) = -(\hat{\alpha}/\hat{\beta})$ to estimate willingness to pay, then the mean WTP estimates (or in this case, discounts) for Certified U.S. chicken breasts, beef steaks, and pork would be −$0.28/pound, −$1.41/pound, and −$0.63/pound, respectively. However, for private goods, it is not very common to expect a negative WTP estimate. Please see Haab and McConnell for a critique of unbounded WTP values.

[7] This result coincides with the finding that only 36.2% of these respondents favored consumers paying

Considering typical U.S. meat supplies and production capacity, nearly all poultry products and approximately 90% and 95% of the beef and pork products sold in the United States could be labeled as Certified U.S. (Brester and Marsh; Plain and Grimes). Thus, under a mandatory COOL program, it is unlikely that consumers would actually have to pay premiums for Certified U.S. meat products unless the costs of COOL were passed on directly to the consumer.[8]

Moreover, Lusk and Anderson estimate that, at a minimum, a 2% increase in aggregate consumer demand for pork and beef would be needed to offset the reduction in producer surplus caused by COOL. As a result, even if the estimated premiums of 2.5% and 2.9% for pork and beef, respectively, labeled with the country of origin did exist, according to Lusk and Anderson's estimates, the premiums would only be enough to offset the negative effect related to COOL. These values also depend on the ability of U.S. producers to maintain a domestic reputation of U.S. meat as being of higher quality relative to major importers.

Furthermore, we caution that, as in any contingent valuation study (CV), our WTP estimates could suffer from hypothetical bias common to these type of studies. Several studies address the point of hypothetical bias of CV results when compared with actual purchasing behavior (see, e.g., Cummings, Harrison, and Rutström; Cummings et al.; List and Gallet). Most of these studies conclude that there is a slight upward bias when dealing with private goods, although the bias is generally smaller than the calibration factor suggested by the National Oceanic and Atmospheric Administration's panel (Arrow et al.). Nevertheless, the application of CV methods is supported by many other studies showing the correspondence between stated preferences and actual market behavior (see, e.g., Haab, Huang, and Whitehead; Loomis).

Accordingly, these WTP estimates provide insight on the relative value consumers place on COOL for beef, pork, and poultry, and they are useful in terms of providing estimates for more in-depth cost–benefit analyses. However, multiple questions arise when conducting a cost–benefit analysis: the selection of the applied rate of discount, the time path of benefits, and the presence of risk and uncertainty associated with each of the estimated benefits and costs. In this paper, our goal is not to estimate a cost–benefit analysis, but rather to provide estimates of potential relative premiums (or estimates of consumer surplus) for meat products that could serve as inputs in future economic analyses.

Robustness Checks

Robustness checks performed in the analysis included a test regarding whether the ordering of the questions affected WTP responses for the meat products. If an ordering effect is present, then the WTP estimates could be biased. Such ordering effects can emerge because of budget restrictions that become more severe as additional WTP questions are presented to the respondents. To test whether an ordering effect exists, two versions of the survey (A and B) were used, altering the order of the questions related to the willingness to pay for U.S. certification of chicken breasts and pork chops. When estimating the WTP equations for chicken breasts and pork chops, an indicator variable was included to reflect the order in which the question was posed to the respondent. This indicator variable was not statistically significant, implying that the WTP estimates were not affected by the order in which the questions were presented to the respondents.

Conclusions and Implications

The COOL provision has become one of the most controversial and widely debated food labeling programs. Previous WTP studies for

directly for the costs related to a mandatory COOL program.

[8] Non-U.S. product would likely be sold in sectors of the industry in which COOL is not required, such as the food service sector. Several studies discuss the expected distribution of COOL-related costs throughout the food chain (see, e.g., Brester and Marsh; Hayes and Meyer; Lusk and Anderson; VanSickle et al.)

COOL have been regional in scope and have focused primarily on beef. This study presents results from a U.S. survey and compares consumer response toward a proposed COOL program applied to beef ribeye steaks, chicken breasts, and pork chops. Results indicate that participants are only willing to pay premiums ranging from 2.5% to 2.9% over the original market price to obtain Certified U.S. chicken breasts, pork chops, and ribeye beef steaks. These premiums are relatively small when compared with the values obtained from more regional WTP studies. Additionally, the estimated premiums for COOL of pork and beef are only large enough to offset previous studies' estimated costs from mandatory COOL. There has been considerable debate over whether or not poultry products should be added to the mandatory COOL provision. The poultry industry would likely benefit the most from the labeling requirements of the 2002 mandatory COOL provision when considering the relative premiums estimated in this study and comparing them with previous cost estimates for COOL of beef, pork, and poultry.

The results of the demographic analysis indicate that the segment of individuals willing to pay for Certified U.S. chicken could be different from the market for beef and pork, particularly in terms of food safety preferences. Consumers who rated food safety inspection as more desirable were more likely to be willing to pay a premium for Certified U.S. chicken. Additionally, the target market of consumers who would be willing to pay a premium for Certified U.S. beef and pork appears to be more distinguishable than the market for chicken labeled with country of origin. In particular, higher educated consumers are less likely to be willing to pay for Certified U.S. pork and beef, and consumers with children in the household are less likely to be willing to pay a premium for COOL of beef. Higher income groups are more likely to be willing to pay a premium for beef and pork labeled with country of origin. Female consumers are more likely to pay for Certified U.S. meat, regardless of the meat type.

Under a mandatory COOL program, it is likely that because of production capabilities of U.S. producers, the supply of Certified U.S. meat would be greater than the demand. As a result, there would be no premiums in the marketplace. However, with a voluntary program, the entire meat case would not necessarily be labeled as a "Product of the U.S.A.," and companies could target market demographic groups of consumers, such as higher income consumers, who might be willing to pay a premium for Certified U.S. beef. Consequently, under a voluntary COOL program, marketers of beef and pork products would be more likely to benefit than under a mandatory program.

Other conclusions drawn from this study indicate that food safety inspection and freshness are the two most important attributes to consumers when purchasing meat. Overall, consumers have a strong confidence in U.S. government agencies as potential certifiers and rate meat produced domestically as safer than meat from major importing countries. Additional research is necessary to further explore how consumers' perceptions of Certified U.S. meat products compare with meat from other countries, such as Australia or New Zealand, in terms of other quality variables such as flavor and nutritional characteristics, as well as price. Future research might also examine how consumers' perceptions toward COOL of vegetables and fruits compare with COOL of meat products.

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